

Gulf Cooperation Council

EDICT OF GOVERNMENT

In order to promote public education and public safety, equal justice for all, a better informed citizenry, the rule of law, world trade and world peace, this legal document is hereby made available on a noncommercial basis, as it is the right of all humans to know and speak the laws that govern them.

GSO 63 (1987) (English): INDUSTRIAL SAFETY AND
HEALTH REGULATIONS - HAZARDOUS MATERIALS - FLAMMABLE
AND COMBUSTIBLE LIQUIDS - PART 2: CONTAINER AND
PORTABLE TANK STORAGE



BLANK PAGE



هيئة التقييس لدول مجلس التعاون دول الخليج العربية
STANDARDIZATION ORGANIZATION FOR G.C.C (GSO)



GSO 63/1987

اشتراطات السلامة والصحة الصناعية

المواد الخطرة – السوائل القابلة للاشتعال

الجزء الثاني : التخزين في الأوعية والصهاريج النقالي

**INDUSTRIAL SAFETY AND HEALTH REGULATIONS –
HAZARDOUS MATERIALS - FLAMMABLE AND
COMBUSTIBLE LIQUIDS – PART 2:
CONTAINER AND PORTABLE TANK STORAGE**

ICS:13.100

**INDUSTRIAL SAFETY AND HEALTH REGULATIONS –
HAZARDOUS MATERIALS - FLAMMABLE AND
COMBUSTIBLE LIQUIDS – PART 2:
CONTAINER AND PORTABLE TANK STORAGE**

Date of GSO Board of Directors' Approval : 05-11-1407H (01-07-1987)
Issuing status : Technical Regulation

CONTENTS

1.	SCOPE AND FIELD OF APPLICATION	2
2.	COMPLEMENTARY REFERENCES	2
3.	DEFINITIONS	2
4.	REGULATIONS.....	3
4.1	Design, Construction and Capacity of Containers	3
4.2	Design, Construction and Capacity of Storage Cabinets	3
4.3	Storage Inside Building.....	5
4.4	Storage Outside Building.....	7
4.5	Fire Control.....	8

**INDUSTRIAL SAFETY AND HEALTH REGULATIONS –
HAZARDOUS MATERIALS - FLAMMABLE AND
COMBUSTIBLE LIQUIDS – PART 2:
CONTAINER AND PORTABLE TANK STORAGE**

1. SCOPE AND FIELD OF APPLICATION

This Standard is concerned with the regulations for storage of flammable or combustible liquids in drums or other containers (including flammable aerosols) not exceeding 0.23 m³ individual capacity and those portable tanks not exceeding 2.5 m³ individual capacity.

This Standard is not applicable to the flammable or combustible paints, oils, varnishes, and similar mixtures used for painting or maintenance when not kept for a period in excess of 30 days.

2. COMPLEMENTARY REFERENCES

- 2.1 GSO 62/1987 “Industrial Safety and Health Regulations - Hazardous Materials - Flammable and Combustible Liquids - Part 1: Tanks, Piping and Accessories”.
- 2.2 GSO 208/1994 concerned with “Industrial Safety and Health Regulations - Buildings Part 3: Fire Protections”.
- 2.3 GSO 218/1994 concerned with “Industrial Safety and Health Regulations - Electrical Part 2: Low Voltage”.

3. DEFINITIONS

- 3.1 Aerosol: A material which is dispensed from its container as a mist, spray, or foam by a propellant under pressure.
- 3.2 Flammable Aerosol: For the purpose of the Gulf standard mentioned in item 2.1 it is considered a Class 1A liquid.
- 3.3 Barrel: A volume of 0.159 cu. m.
- 3.4 Closed Container: A container so sealed by means of a lid or other device that neither liquid nor vapour will escape from at ordinary temperatures.
- 3.5 Portable Tank: Closed container having a liquid capacity over 0.227 cu. m and not intended for fixed installation.
- 3.6 Safety Can: Approved container, of not more than 100 litres capacity, having a spring-closing lid and spout cover and so designed that it will safely relieve internal pressure when subjected to fire exposure.

4. REGULATIONS

4.1 Design, Construction, and Capacity of Containers

4.1.1 Only approved containers and portable tanks shall be used.

4.1.2 Each portable tank shall be provided with one or more devices installed in the top with sufficient emergency venting capacity to limit internal pressure under fire exposure conditions to 68.65 kPa or 30 percent of the bursting pressure of the tank, whichever is greater. The total venting capacity shall be not less than that specified in the Gulf standard mentioned in item 2.1. At least one pressure-actuated vent having a minimum capacity of 170 cu. m of free air (101.3 kPa and 15.6°C) shall be used. It shall be set to open at not less than 34.33 kPa. If fusible vents are used, they shall be actuated by elements that operate at a temperature not exceeding 149°C.

4.1.3 Flammable and combustible liquid containers shall be in accordance with Table 1 except that glass or plastic containers of no more than 4 litres capacity may be used for a Class 1A or 1B flammable liquid if:

4.1.3.1 Such liquid would either be rendered unfit for its intended use by contact with metal or would excessively corrode a metal container so as to create, a leakage hazard; and

4.1.3.2 The user's process would either require more than 0.5 litre of a Class 1A liquid or more than 1 litre of a Class 1B liquid of a single assay lot to be used at one time, or would require the maintenance of an analytical standard liquid of a quality not met by the available relevant liquids standards, and the quantity of the analytical standard liquid required to be used in any one control process exceeds 1/16 the capacity of the container allowed under Table 1 for the class of liquid.

4.2 Design, Construction and Capacity of Storage Cabinets

4.2.1 Not more than 0.23 cu. m of Class 1 or 2 liquids, and not more than 0.45 cu. m of Class 3 liquids may be stored in a storage cabinet.

Table (1)

Maximum Allowable Size of Containers and Portable Tanks (in Litres)

Container Type	Flammable Liquids			Combustible Liquids	
	Class 1A	Class 1B	Class 1C	Class 2	Class 3
Glass or Approved					
Plastic	0.5	1	4	4	4
Metal	4	20	20	20	20
Safety Cans	8	20	20	20	20
Approved Portable Tanks	2640	2640	2640	2640	2640

Container exemptions: (a) medicines, foodstuffs, cosmetics, and other common consumer items, when packaged according to commonly accepted practices, shall be exempted from the requirements of item 4. 1. 1.

4.2.2 Fire Resistance:

Storage cabinets shall be designed and constructed to limit the internal temperature to not more than 162°C when subjected to a 10 minute fire test in a furnace. The furnace temperature shall be 38°C at 0 minute, 538°C at 5 minutes, and 704°C at 10 minutes. All joints and seams shall remain tight and the door shall remain securely closed during the fire test. Cabinets shall be labelled in conspicuous lettering, "Flammable-Keep Fire Away".

4.2.2.1 Metal cabinets constructed in the following manner shall be deemed complying:

The bottom, top, door and sides of cabinet shall be at least 1.25 mm sheet iron and double walled with 38 cm air space. Joints shall be riveted, welded or made tight by some equally effective means. The door shall be provided with a three-point lock, and the door sill shall be raised at least 5 cm above the bottom of the cabinet.

4.2.2.2 Wooden cabinets constructed in the following manner shall be deemed complying:

The bottom, sides, and top shall be constructed of an approved grade of plywood at least 25 cm in thickness, which shall not break down or delaminate under fire conditions. All joints shall be rabbeted and shall be fastened in two directions with flathead woodscrews. When more than one door is used, there shall be rabbeted overlap of not less than 25 cm. Hinges shall be mounted in such a manner as not to lose their holding capacity due to loosening or burning out of the screws when subjected to the fire test.

4.2.3 Design and Construction of Inside Storage Rooms

4.2.3.1 Inside storage rooms shall be constructed to meet the required fire-resistive rating for their use. Openings to other rooms or buildings shall be provided with non-combustible liquid-tight raised sills or ramps at least 10 cm in height, or the floor in the storage area shall be at least 10 cm below the surrounding floor. Openings shall be provided with approved selfclosing fire doors. The room shall be liquid-tight where the walls join the floor.

A permissible alternate to the sill or ramp is an open-grated trench inside the room which drains to a safe location. Wood of at least 2.5 cm thickness may be used for shelving, racks, dunnage, scuffboards, floor overlay, and similar installations.

4.2.3.2 Storage in inside storage rooms shall comply with Table 2.

Table 2
Storage in Inside Rooms

Fire Protection* Provided	Fire Resistance	Maximum Size (Sq. m)	Total Allowable Quantities (cu. m / sq. m floor area)
Yes	2 hours	46.5	0.407
No	2 hours	46.5	0.163
Yes	1 hour	13.9	0.204
No	1 hour	13.9	0.081

* Fire protection system shall be sprinkler, halon, carbon dioxide or other system.

- 4.2.3.3 Electrical wiring and equipment located in inside storage rooms used for Class 1 liquids shall be approved for Class 1 and Class 2, Division 2 Hazardous Location; for Class 3 Liquids, shall be approved for general use. (See the Gulf standard mentioned in item 2.3).
- 4.2.3.4 Every inside storage room shall be provided with either a natural ventilation system or a mechanical exhaust ventilation system. Such system shall be designed to provide for a complete change of air within the room at least six times per hour. If a mechanical exhaust system is used, it shall be controlled by a switch located outside of the door. The ventilating equipment and any lighting fixtures shall be operated by the same switch. A pilot light shall be installed adjacent to the switch if Class 1 flammable liquids are dispensed within the room.
- 4.2.3.5 In every inside storage room there shall be maintained one clear aisle at least 1 m wide. Containers over 0.113 cu. m capacity shall not be stacked one upon the other. Dispensing shall be by an approved pump or self-closing faucet only.
- 4.3 Storage Inside Building
- 4.3.1 Flammable or combustible liquids, shall not be stored so as to limit use of exits, stairways, or areas normally used for the safe egress of people.
- 4.3.2 Storage of flammable or combustible liquids in containers or portable tanks shall comply with item 4.3.3 and 4.3.4.
- 4.3.3 Storage shall be prohibited except that which is required for maintenance and operation of building and operation of equipment. Such storage shall be kept in closed metal containers stored in a storage cabinet or in safety cans or in an inside storage room not having a door that opens into that portion of the building used by the public.
- 4.3.4 Storage shall be in accordance with Table 3 or 4 and in buildings or in portions of such buildings cut off by standard firewalls. Material creating no fire exposure hazard to the flammable or combustible liquids may be stored in the same area.

Table 3
Indoor Container Storage

Class of liquid	Storage Level	Protected Storage Maximum per Pile (cu. m)	Unprotected Storage Maximum per Pile (cu. m)
1A	Ground and upper floors Basement	10.4 Not permitted	2.5 Not permitted
1B	Ground and upper floors Basement	20.8 Not permitted	5.2 Not permitted
1C	Ground and upper floors Basement	62.5 Not permitted	15.6 Not permitted
2	Ground and upper floors Basement	62.5 20.8	15.6 Not permitted
3	Ground and upper floors Basement	20.8 31.2	52.0 Not permitted

Note 1: When two or more classes of materials are stored in a single pile, the maximum cu. m permitted in that pile shall be the smallest volume permitted for any of the individual classes of materials in the pile.

Note 2: Aisles shall be provided so that no container is more than 3.7 m from an aisle. Main aisles shall be at least 2.4 m wide and side aisles at least 1.12 m wide.

Note 3: Each pile shall be separated from the other by at least 1.2 m.

Table 4
Indoor Portable Storage

Class of Liquid	Storage Level	Protected Storage Maximum per Pile (cu. m)	Unprotected Storage Maximum per Pile (cu. m)
1A	Ground and upper floors Basement	Not permitted Not permitted	Not permitted Not permitted
1B	Ground and upper floors Basement	75.7 Not permitted	75.7 Not permitted
1C	Ground and upper floors Basement	151.4 Not permitted	20.82 Not permitted
2	Ground and upper floors Basement	151.4 75.7	20.82 Not permitted
3	Ground and upper floors Basement	227.1 75.7	83.3 Not permitted

***Note 1:** When two or more classes of materials are stored in a single pile, the maximum cu. m permitted in that pile shall be the smallest volume permitted for any of the individual classes of materials in the pile.*

***Note 2:** Aisles shall be provided so that no portable tank is more than 3.6 m from an aisle. Main aisles shall be at least 2.4 m wide and side' aisles at least 1.2 m wide.*

***Note 3:** Each pile shall be separated from the other by at least 1.2 m.*

- 4.3.5 The arrangement of storage shall comply with Table 3 or 4.
- 4.3.5.1 Containers in piles shall be separated by pallets or dunnage where necessary to provide stability and to prevent excessive stress on container walls.
- 4.3.5.2 Portable tanks stored over one tier high shall be designed to nest securely without dunnage and adequate materials handling equipment shall be available to handle tanks safely at the upper tier level.
- 4.3.5.3 No pile shall be closer than 1 m to the nearest beam, chord, girder, or other obstruction, and shall be 1 m below sprinkler deflectors or discharge orifices of water spray, or other overhead fire protection systems.
- 4.3.5.4 Aisles of at least 1 m wide shall be provided where necessary for reasons of access to doors, windows or stand pipe connections.
- 4.4 Storage Outside Buildings
- 4.4.1 The storage area shall be graded in a manner to divert possible spills away from buildings or other exposures or shall be surrounded by a curb at least 15 cm high. When curbs are used, provisions shall be made for draining of accumulations of ground or rain water or spills of flammable or combustible liquids. Drains shall

terminate at safe location and shall be accessible to operation under fire conditions.

- 4.4.2 The storage area shall be protected against tampering or trespassers and shall be kept free from weeds, debris and other combustible material not necessary for the storage.
- 4.5 Fire Control
- 4.5.1 Suitable fire control devices, such as small hoses or portable fire extinguishers, shall be available at locations where flammable or combustible liquids are stored.
- 4.5.2 When sprinklers are provided, they shall be installed in accordance with the Gulf standard mentioned in item 2.2.
- 4.5.3 Open flames and smoking shall not be permitted in flammable or combustible liquid storage areas.
- 4.5.4 Materials which will react with water shall not be stored in the same area with flammable or combustible liquids.
- 4.5.5 Smoking is prohibited in plant areas that are subject to contamination by flammable liquids or gases. In areas not subject to such contamination the employer may, if he so desires, permit smoking. Areas within which smoking is permitted shall be conspicuously posted and marked as safe for smoking. However, if the major areas of a plant are safe for smoking the employer may, alternatively, post and mark the areas within which smoking is prohibited.
- 4.5.6 "Strike anywhere" matches shall not be allowed within plants.
- 4.5.7 Cigar or cigarette lighters except those having the flint, steel, and operating mechanism enclosed in such a manner as to prevent the possibility of accidental lighting or sparking, shall not be allowed.
- 4.5.8 No employee shall carry a torch lighter of the spark type in an area where sources of ignition are forbidden, except when sheathed or otherwise protected against accidental operation.
- 4.5.9 A hose carrying steam used for cleaning, fire protection, or for other purposes, shall be equipped with one or more handles near the discharge end of the hose. The handle or handles shall be of a type that will protect the operator from burns by heated metal or steam.
- 4.5.10 Flammable waste gases or vapours liberated to the atmosphere from processing units shall be burned unless the place of liberation, or the quantity liberated, is such that the gases or vapours will not endanger employees.
- 4.5.11 Fire Permits
- 4.5.11.1 A written and numbered fire permit issued and signed by the employer or his authorized agent shall be required before a source of ignition is used, except:
- In connection with fixed fired equipment.
 - In laboratories and pilot plants required for operating purposes but not sources of ignition used in the maintenance of equipment.

- c) Within designated, marked, or posted smoking areas within plants; or in locations outside of plants where it would be safe to smoke.
- d) In locations where compliance with the order would result in the employer or his authorized agent issuing a fire permit to himself; or, where the use of a source of ignition, in connection with work upon a liquid or gas transmission pipe line remote from plants, does not affect the normal movement of the contents of the line, provided, however, that either case shall comply with the safety provisions of item 4.5.11.3, 4.5.11.4 and 4.5.11.7.
- e) Within a construction area, or maintenance shop area, meeting the following conditions and when posted by the employer in a manner to define the boundaries:
 - 1- The area shall be remotely located from process equipment which is being operated.
 - 2- The area shall be free from flammable liquid and gases except as may be required for necessary activities when safely used, handled and stored.
 - 3- The area shall be effectively protected against the possibility of flammable liquids or gases being liberated within the area from pipe lines, sewers, drains or ditches.

4.5.11.2 A fire permit shall designate the effective date; the place of use; and the hours during which the source of ignition may be used, provided, however, that the life of a permit, unless an earlier termination is specified, shall terminate at the beginning of the first daylight shift following the issuance of the permit; or, at any prior time that a change in the conditions upon which the permit was issued, or other unexpected circumstance would make the continued use of the source of ignition hazardous. The fire permit shall designate the specific area or piece of equipment, the nature of the use and any special precautions or limitations to be observed before or during the use of the source of ignition.

4.5.11.3 Before a fire permit is issued the employer shall cause the location where the source of ignition is to be used, to be inspected or tested to determine that the source of ignition may be safely used. If the permit is for the use of a source of ignition in a confined space, a test of the atmosphere in the confined space shall be made. No fire permit shall be signed until the foregoing conditions have been met and unless the flammable gas or vapour content is less than 25 percent of the lower explosive limit.

4.5.11.4 When a source of ignition that requires a fire permit is to be used, the following requirements, if applicable, shall be met:

- a) Oil accumulations in exposed area shall be removed from floors and ground.
- b) Oil soaked floors or ground in exposed area shall be covered with clean earth or other noncombustible material, water flushed or water sprayed.
- c) Combustible material that may be ignited shall be covered with noncombustible material or kept wet.

- d) Gauge glasses containing flammable liquid or gas and exposed to spatter of molten metal shall be drained and their cocks closed, or effectively guarded against breakage.
- 4.5.11.5 The signed fire permit shall be kept on the job where the source of ignition is being used until the work is completed, the permit expires, or revoked.
- 4.5.11.6 A copy of each issued permit shall be kept on file at the plant of issue for at least six months after date of issue.
- 4.5.11.7 Fire extinguishing equipment shall be readily available to the employees who are using a source of ignition in places which require a fire permit.